NHDOT SPR2 PROGRAM
RESEARCH PROGRESS REPORT

Project # SPR 26962Y		**Report Period** Year 2019 ☐Q1 (Jan-Mar) ☐Q2 (Apr-Jun) ☐Q3 (Jul-Sep) X Q4 (Oct-Dec)
Project Title: Assessment of Embedded Culvert Low Flow Hydraulics		
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Project Start Date: May 1, 2019	**Project End Date:** April 30, 2021	**Project schedule status:** X On schedule ☐ Ahead of schedule ☐ Behind schedule

Brief Project Description:

The proposed research has two fundamental thrusts: to field study constructed embedded culverts in NH, and a thorough literature review. The project will begin with a TAG kickoff meeting to provide context for the study and to fine tune the scope. The office portion of the research will begin with the literature review. Lines of communication (phone, e-mail) will also be opened with regulating entities in other states (in neighboring states and Pacific northwest and Alaska) to solicit their experiences with embedded culverts. This will include gathering design specifications from those jurisdictions. The research team will also collect and sift through the technical guidance documents for other states, FHWA, and countries and compare to NH guidance. The construction community will be interviewed to determine if there are limitations in the supply or placement of the embedment material available in New Hampshire. NH DOT will provide a list of its embedded culverts and NH DES can augment the list with permitted and constructed non-DOT structures. NH DOT personnel will be interviewed to determine where they have installed embedded culverts and to collect their design plans. The NHDES permit database will also be searched for all embedded culverts installed in New Hampshire. The embedded culverts from the DOT and DES sources will all be targeted for field visits. Knowledge of the location of each culvert will allow investigation into watershed and hydrologic characteristics at the site of each culvert. These characteristics will be documented via online resources such as StreamStats and GRANIT. The DOT and DES culvert databases will also yield embedded culvert metadata such as: year constructed, embedment particles size distribution, embedment depth, etc.

Progress this Quarter (include meetings, installations, equipment purchases, significant progress, etc.):

The past quarter continued field measurements and particle size distribution analysis of in-culvert sediments.

Items needed from NHDOT (i.e., Concurrence, Sub-contract, Assignments, Samples, Testing, etc…):

No urgent needs, but updates on any newly installed embedded culverts.

Anticipated research next three (3) months:

Due to the climate conditions expected in the next quarter, efforts will continue on the particle size distribution analyses. Also, determining the installed embedded particle size distribution from the design plans. Streamgaging data from summer 2019 will be reduced. Finally, agency contacts from other states will be contacted and information gathered on embedment approaches, designs, and performance in their states.

Circumstances affecting project:

A handful of the culverts visited to date were either tidal or had standing water in excess of two feet. In such systems, aquatic organism passage and low flows disappearing into the embedded sediments should not be an issue.
Most of the embedded culverts were designed to have large embedment material. This then would entail a particle count method to estimate the particle size distribution since cobble and larger sized particles cannot be realistically sieved. When the sites were sampled, sediments were gravel-sized and smaller. These samples need to be analyzed via ASTM sieve analysis methods, which are much more time consuming than the particle count method.

Budget, scope, and timing are all on schedule. One circumstance out of our hands is having Mother Nature cooperate with

low flows. The past summer was not particularly dry, and as such, only six culverts were stream gaged to date. At this writing, no specific recommendation is made to address hydrology other than to look towards the next field season.

Tasks (from Work Plan)	Planned % Complete	Actual % Complete
Task 1 Kickoff meeting	100%	100%
Task 2 Field Efforts	40%	30%
Task 3 Review of other Technical Guidance	10%	10%